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Prevention of harm caused by alcohol exposure in pregnancy

Rapid review and case
studies from Member States





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By: Lisa Schölin

Abstract

The lifelong disabilities caused by exposure to alcohol in pregnancy (known as fetal alcohol spectrum disorders), together with other negative effects of exposure to alcohol on the pregnancy, are an important public health concern. In the WHO European Region and the European Union (EU), alcohol use among women of childbearing age is common and while many women may drink before they know they are pregnant and stop once they find out, some continue to drink after they have discovered that they are pregnant. A major concern is the number of unplanned pregnancies where the woman will continue to drink well into her pregnancy. Ensuring health in early life is a particular focus of public health policy in the Region and the EU, which includes *in utero*. This report gives an overview of the literature on interventions to prevent alcohol exposure during pregnancy that target both pregnant and non-pregnant women, in line with policy documents in the EU and the Region. It reviews the literature on prevention of alcohol exposure in pregnancy from studies published in the last decade. Case studies from eight regional Member States are presented, to share experiences of prevention in the Region.

Keywords

Alcohol drinking – prevention and control
Alcohol drinking – adverse effects
Fetal alcohol spectrum disorders – prevention and control
Harm reduction
Pregnancy
Health promotion
Finland
Germany
Lithuania
Luxembourg
Norway
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Abbreviations

AEP	alcohol exposed pregnancy	EU 27	countries belonging to the European Union after January 2007
AUDIT	Alcohol Use Identification Test (10-item)	FAS	fetal alcohol syndrome
AUDIT-C	Alcohol Use Identification Test (three-item)	FASD	fetal alcohol spectrum disorders
BALANCE	Birth control and Alcohol Awareness: Negotiating Choices Effectively	ITT	intention to treat (analysis)
CAGE	Cut down, Annoyed, Guilty, Eye-opener	IVF	<i>in vitro</i> fertilization
CHOICES	Changing High-Risk Alcohol Use and Improving Contraception Effectiveness Study	pFAS	partial fetal alcohol syndrome
CI	confidence interval	OR	odds ratio
EARLY	a shortened version of BALANCE without contraception counselling	SD	standard drink
e-CHUG	eCheckup to go	TV	television
EU	European Union	T-ACE	Tolerance, Annoyed, Cut down, Eye-Opener
		TWEAK	Tolerance, Worried, Eye-Opener, Amnesia, Cut down

Foreword

In 2016, the European Commission and the WHO Regional Office for Europe started a three-year project to monitor the situation on alcohol in the European Union (EU). One of the outcomes of this work is the current report on prevention of alcohol exposure during pregnancy.

Protecting the unborn child from alcohol during pregnancy has a central place in the WHO action plan to reduce the harmful use of alcohol 2012–2020 and the EU strategy to support member states in reducing alcohol-related harm from 2006.

The use of alcohol during pregnancy can lead to multiple health and social problems for both mother and child, and alcohol use during pregnancy can cause fetal alcohol spectrum disorders, including fetal alcohol syndrome, and other harms such as stillbirth, spontaneous abortion and low birthweight.

In 2014, the WHO Guidelines for the identification and management of substance use and substance use disorders in pregnancy were published. The overarching principle is that “preventing, reducing and ceasing the use of alcohol and drugs during pregnancy and in the postpartum period are essential components in optimizing the health and well-being of women and their children”. There is no safe level of alcohol use during pregnancy and WHO therefore recommends that health care providers should ask all pregnant women about their use of alcohol as early as possible in the pregnancy and at every antenatal visit.

This report includes a review of studies published in the last decade on interventions to prevent alcohol exposure during pregnancy that target pregnant and non-pregnant women, in line with policy documents in the EU and the Region. In addition to this review, case studies from regional Member States are presented, to share experiences of prevention in the Region.

We at the WHO Regional Office for Europe hope that this report will inspire Member States to expand their activities designed to increase the knowledge of the harmful effects of alcohol for the fetus and also to continue to develop the effective identification of alcohol use during pregnancy.

Gauden Galea

Director, Division of Noncommunicable Diseases and Promoting Health through the Life-Course
WHO Regional Office for Europe



**[Executive
summary]**

Background

The use of alcohol by women has increased over time, and a large proportion of women in the WHO European Region and the European Union (EU) drink alcohol. The potential harm to the fetus caused by drinking in pregnancy is a public health concern in the Region, particularly as almost half of all pregnancies are unplanned and are, therefore, at higher risk from inadvertent alcohol exposure. Risks from alcohol exposure in pregnancy include miscarriage, preterm birth and fetal alcohol spectrum disorders. Harm to others, including the unborn child, is a priority in many health policies in the EU and the Region. Furthermore, EU and regional policy documents, together with guidelines for substance use in pregnancy, highlight the need for interventions in women of childbearing age and pregnant women. This report includes a rapid review of interventions to prevent alcohol exposure in pregnancy, and presents preventive work being undertaken in the Region.

Rapid review

The report includes 29 studies focusing on prevention efforts among non-pregnant and pregnant women. Several studies showed the effectiveness of pre-conception interventions in bringing down the risk of exposure to alcohol during a pregnancy by reducing risky drinking, increasing the use of contraception, or both. The use of brief interventions for pregnant women suggested that they can be effective in women who drink at higher levels and when their partners are included. Several studies found no significant difference between the in-

tervention and control groups, which suggests that an assessment of alcohol habits on its own may encourage changes in behaviour. There was limited evidence for the effectiveness of using wider public health education approaches through campaigns, but results suggested that campaigns tailored to the target group and consideration given to the framing of the message may encourage women to abstain from alcohol during pregnancy.

Conclusions

The evidence on pre-conception interventions shows promising results in encouraging changes in risky drinking and greater use of contraception among women. The WHO *Guidelines for the identification and management of substance use and substance use disorders in pregnancy* recommend screening for all pregnant women and brief interventions for all women who drink. This review shows that interventions for pregnant women can be effective although overall the evidence is not conclusive. More research is needed in the Region.

Case studies

Among the eight regional Member States included, a wide variety of activities are presented. These included carrying out large-scale national campaigns, strengthening responses in maternal health care through screening and improving referral and treatment options, encouraging research, and mobilizing advocacy through collaboration between governmental and nongovernmental organizations.



[Introduction]

Women, alcohol, and pregnancy

The highest levels of alcohol consumption in the world are seen in the WHO European Region. Many women in the Region drink alcohol, which significantly contributes to the burden of disease and mortality (1,2). With increasing gender equality and shifting gender roles, women's drinking has increased over time (1). Estimates calculated for the 27 countries in the European Union (EU) showed that 82.1% of women are current drinkers and 3.4% of women drink alcohol at high levels (2).¹ The *Global Status Report on Alcohol and Health 2014*, which covers the entire WHO European Region, showed that 59.9% of women are current drinkers (1). In the adult population (aged 15 years and above), women in the Region on average drink 10.1 litres of pure alcohol per year and 2.9% of them have an alcohol use disorder. Among drinkers in the Region, 12.6% of women engage in heavy episodic drinking,² a much lower figure than for men (31.8%) (1). Among young people in Europe, however, the gender gap is small: 55% of girls and 57% of boys report any use in the last 30 days and 38% of girls and 43% of boys binge drink (3).³ Findings from the *Health Behaviour in School-aged Children Survey* indicated that while alcohol consumption has fallen among adolescents in Europe in the last decades, the gender differences in drinking have also narrowed, suggesting a convergence between the genders in drinking (4).

Women do not always plan to get pregnant; in fact alcohol use has been linked to an increased risk of sexual risk-taking and subsequently the risk of an unplanned pregnancy (5–7). The rate of unplanned pregnancies in the Region is estimated to be 43 per 1000 women, 45% of all pregnancies (8). The rates vary by country, but more importantly, younger women are more likely to have an unplanned pregnancy. A British study showed, for example, that the highest prevalence of unplanned pregnancies was among women aged 16–19 years (45.2%) (9). Because a pregnancy is not always planned, many women continue to drink at their pre-pregnancy levels until pregnancy is confirmed. A cross-sectional study from New Zealand found that among currently pregnant women and women who had previously been pregnant, 49.6% and 36.7%, respectively, had consumed alcohol before they found out that they were pregnant but stopped as soon as they found out. In these two groups around one in five and one in four had stopped drinking before they got pregnant. Among women who had been pregnant before,

younger women (16–24 years) were more likely to report any alcohol use in early pregnancy as well as binge drinking in early pregnancy compared to all older age groups (10). A study that explored alcohol use among Russian women who were actively trying to get pregnant showed that 61% and 72% of women from two different regions reported binge drinking (11).⁴ The developmental processes in the early stages of pregnancy can be impaired or altered by alcohol, which makes risky drinking around the time of conception problematic.

The proportion of women who continue to drink during pregnancy varies between countries. A study in the United States of America found that 22.8% of women continued to drink (12), and an Australian study found that as many as 82% of women drank in pregnancy (13). In European countries the prevalence also varies: a Swedish study showed that only a minority (6%) drank alcohol in pregnancy (14), while a Norwegian study found that 35.8% continued to drink (15) and a United Kingdom study found that the prevalence of alcohol use in early pregnancy was 29.5% (16). A large study comparing prevalence across several datasets on cohorts from Australia, Ireland, New Zealand and the United Kingdom found that the prevalence varied from 20% up to 80% (17). It appears, therefore, that alcohol use in pregnancy is prevalent in some countries, which may be related to demographic, social or cultural factors. However, methodological differences across studies with reporting at different times in pregnancy may explain some of this variation.

Women who continue to drink generally appear to reduce the frequency and amount that they consume. A Norwegian study showed that after week 13, no woman consumed over seven standard drinks (SDs)⁵ per week. The majority of women who continued to drink after week 12 drank less than 3.5 SD per week. Binge drinking was reported by 24.5% of women up to the sixth week six of pregnancy, although after that week fewer than 2% reported binge drinking, probably as a result of discovering they were pregnant (15). Similar findings were reported in a Canadian study, where 70.4% of women who drank during their pregnancies drank once per month or less. The majority reported drinking one to two drinks per drinking day (53.2%) or one drink or less (42.6%) (18). An Irish study found, however, that despite only 5% of women reporting drinking in early pregnancy, 25% of women who drank reported binge drinking at least once a month (19). When considering specific factors that predict continued alcohol use in pregnancy, a systematic review found that the two consistent predictors were exposure to violence from intimate partners and higher consumption levels before pregnancy (20). The higher likelihood of alcohol use in pregnancy among women who drink more frequently and at higher levels before pregnancy indicates that

¹ Consumption of 40 g of pure alcohol or more per day.

² Consumption of 60 g of pure alcohol or more per occasion at least once per month.

³ Consumption of five or more units on one occasion (one unit equals 8 g of pure alcohol).

⁴ Consumption of four or more drinks of 14 g of alcohol per occasion.

⁵ One SD equals 12–13 g of pure alcohol.

screening and brief interventions in women's health services may be important to prevent alcohol-related harm caused by prenatal exposure (21).

The effects of alcohol exposure on reproduction and child health

A high alcohol intake can affect the ability to conceive (22,23) as well as bring about pregnancy complications and impaired fetal development, including low birth weight (24,25), small for gestational age (26) and preterm birth (27,28). Alcohol can interfere with fetal development and cause a range of disorders on a continuum of severity, known as fetal alcohol spectrum disorders (FASD) (29,30). The most severe outcomes of prenatal drinking are related to frequency of heavy drinking and pattern of drinking, the most risky being binge drinking patterns (31). Timing of exposure also influences outcomes as certain stages of pregnancy, particularly in the first trimester, involve crucial developments in the fetus (32). The evidence of negative outcomes from smaller amounts is, however, conflicting (33). In addition to individual sensitivities to alcohol, no amount of alcohol can, therefore, be considered safe during pregnancy (31).

As indicated above, FASD is not a diagnosis; it is an umbrella term used to describe the range of features related to prenatal alcohol exposure. Fetal alcohol syndrome (FAS) is the most severe end of the spectrum of congenital birth defects. Three main outcomes are evident in the condition: (i) impaired growth, (ii) facial abnormalities, and (iii) damage to the central nervous system. Apart from the physical anomalies, the effects on the central nervous system result in sustained behavioural and cognitive dysfunction which affects the individual throughout life (34). The prevalence of FASD varies between countries and populations and over time (35,36). Prevalence rates also vary depending on the method of data collection and setting (36). In settings such as foster care, prisons and correction facilities as well as among aboriginal populations, FASD is more prevalent than in school or community settings (37).

An overview of prevalence studies, primarily conducted in the United States, found a prevalence of FAS in passive surveillance studies at 0.265 cases per 1000 (median). The highest rates were found in active case ascertainment studies (commonly conducted in high-risk populations) at 38.2 cases per 1000 (mean) (36). Individual studies from Europe have indicated high prevalences, for example 7.4 FAS cases

per 1000 and 40.5 FASD cases per 1000 in the Lazio region in Italy (35) and a combined prevalence of FAS and partial FAS (pFAS) (where prenatal alcohol exposure is confirmed but not all criteria for FAS diagnosis are present (38)) at 66.7 cases per 1000 in a rural province of Croatia (39). It has been acknowledged that FASD is probably considerably underreported (40) and the true prevalence of harm caused by alcohol use in pregnancy is, therefore, unknown. FASD affects individuals throughout life and is associated with high costs for society (41), which makes prevention of this condition a public health priority.

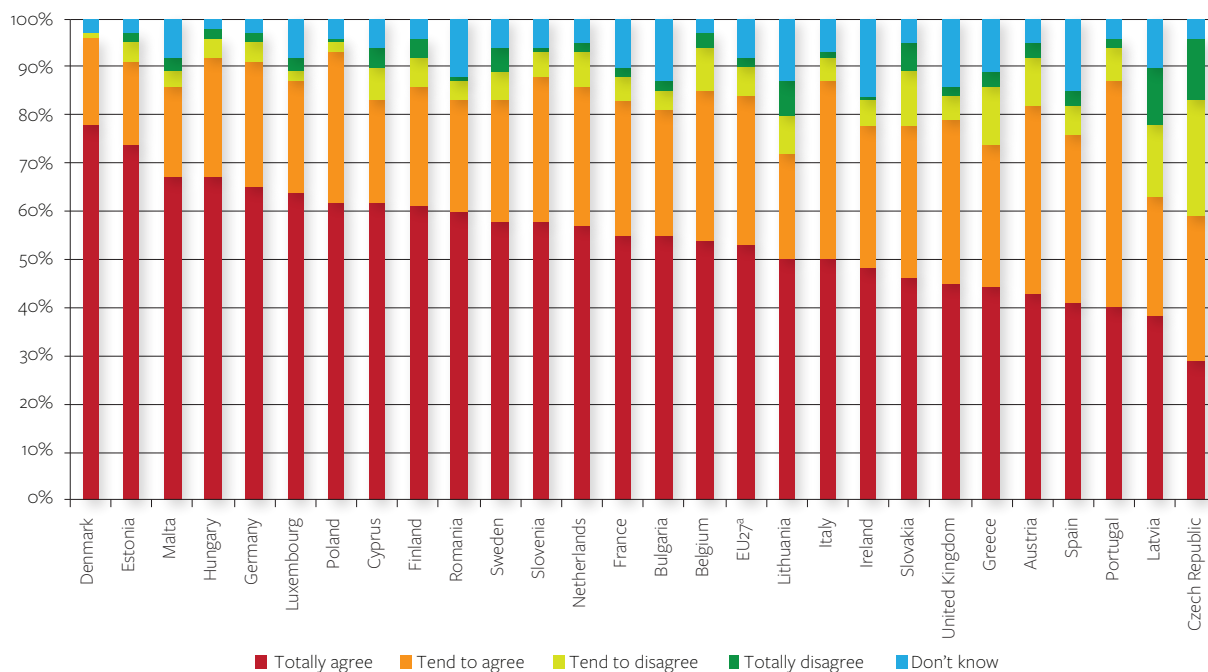
The knowledge of risks associated with alcohol exposure in pregnancy varies within the EU. A survey conducted in 2010 on behalf of the European Commission, which asked citizens about their attitudes towards alcohol, including knowledge of risks, showed that 74% totally agreed that alcohol can cause liver disease (the highest level of agreement) and 53% totally agreed that alcohol could cause birth defects. Overall, 84% totally agreed or tended to agree that alcohol could cause birth defects (88% of women and 83% of men). The range within the EU was wide, from 29% total agreement in the Czech Republic to 78% total agreement in Denmark (Fig. 1) (42).

Policy on prevention of alcohol-related harm

WHO and EU policy documents have, in recent years, specifically addressed and provided guidance on the prevention of prenatal alcohol exposure. *Health 2020 – A European policy framework and strategy for the 21st century* emphasizes the importance of a life-course approach to improving the health of the population in Europe (43). As maternal good health is essential for a healthy start in life, which significantly influences better health later in life (43), European health policy needs to be guided with a life course approach in mind. Healthy pregnancies, as well as women's ability to make informed choices about if and when they want to have a child, are important factors in providing children with the best start in life (44).

Health 2020 is a broad policy framework for the overall health and well-being of the European population. More specifically, the *Action Plan for Implementation of the European Strategy for the Prevention and Control of Noncommunicable Diseases 2012–2016* (45) covers the area of noncommunicable diseases and their risk factors, including alcohol. This Action Plan emphasizes prevention through a life-course approach, which is also reflected in Health 2020.

Fig. 1. Agreement that alcohol can cause birth defects



^aEU27: countries belonging to the EU after January 2007.

Investing in children: the European child and adolescent health strategy 2015–2020 continued the life course approach adopted in *Health 2020* through a more narrow focus on children and adolescents as the target population (46). The strategy stresses that a life-course approach entails prevention and health promotion during the prenatal period, as well as issues regarding alcohol consumption, sexual risk-taking and unplanned pregnancies among adolescents (46). The *Action Plan on Youth Drinking and on Heavy Episodic Drinking (Binge Drinking) 2014–2016*, endorsed by the Committee on National Alcohol Policy and Action in 2014 (47), extends one of the focus areas of the EU strategy to support member states in reducing alcohol-related harm (which expired in 2012). The EU strategy aimed to protect the unborn child, children and young people from alcohol-related harm, and specifically set out to reduce the prevalence of fetal alcohol disorders by targeting drinking during pregnancy (48). The Action Plan specifically sets out how to reduce the harmful effects of alcohol in the young population, including on the unborn child. The need to raise awareness of the risks with drinking during pregnancy for women who are pregnant, trying to get pregnant or breastfeeding is specifically mentioned (47).

In 2011, the WHO Regional Committee for Europe in resolution EUR/RC61/R4 endorsed the *European action plan to reduce the harmful use of alcohol 2012–2020* (49), one of whose aims was to reduce alcohol-related harm to oth-

ers. The European action plan reflected the policy and intervention areas set out in the *Global strategy to reduce the harmful use of alcohol* (50), in which women of child-bearing age, pregnant women and children are mentioned as groups within populations where harmful use of alcohol affects other individuals than just the drinker. One of the policy and intervention areas in the Global strategy focused on health services response. The European action plan (49) set out enhanced prevention in primary care as a way to reduce harm to others as a result of hazardous or harmful use⁶ of alcohol. This includes identification of hazardous and harmful use of alcohol, with specific mention of midwifery and obstetric services. One of the indicators in the European action plan is the routine collection of the incidence of FAS according to the International Classification of Diseases 10th edition diagnostic system (Q86.o). Data in the European Information System on Alcohol and Health show that 11 of the 53 Member States routinely collect such data, whereas 36 do not (51). Six countries were missing data on this indicator. The need for data is important in relation to monitoring and research, but ensuring that children are diagnosed is important to ensure affected children get appropriate support. The European action plan also makes recommendations for regional Member States to produce regular reports on alcohol use in pregnancy together with data on adult consumption habits (49).

⁶ Consumption of 40 g or more per day for men and 30 g or more per day for women.

Screening for alcohol use in pregnancy

WHO's *Guidelines for the identification and management of substance use and substance use disorders in pregnancy* (52) recommend that all pregnant women should be assessed for alcohol and substance use in the early stages and, indeed, throughout their pregnancies (strong recommendation, low quality of evidence). The guidelines do not state how health practitioners should assess alcohol use but they do mention several alcohol screening tools such as the Alcohol Use Identification Test (AUDIT) (53), Tolerance, Worried, Eye-opener, Amnesia, Cut down (TWEAK) (54), and Tolerance, Annoyed, Cut-down, Eye-opener (T-ACE) tools (55). The effectiveness of alcohol screening tools in primary care is established: AUDIT has shown a good ability to identify people on several dimensions of risky or harmful drinking, and CAGE (Cut down, Annoyed, Guilty, Eye-opener) has proved to identify people with alcohol abuse or alcohol dependency. Many screening tools were, however, initially tested on male populations with the focus on detecting alcohol abuse or dependency. The application of these screening tools to women, especially pregnant women, was less clear (56). Research in the 1980s and 1990s focused on developing screening tools that would be appropriate for pregnant populations. The first tool was the T-ACE instrument, which was followed by the TWEAK test. The full 10-item AUDIT was shortened down to a three-item tool (AUDIT-C), which was found to work well with pregnant women (57). A systematic review of screening tools for pregnant women found that the AUDIT-C, T-ACE, and TWEAK tests had high levels of sensitivity and specificity for identifying those who were drinking at risky levels. The sensitivity rate for T-ACE was 69–88% and specificity 71–89%; the corresponding rates for TWEAK were 71–91% and 73–83% and for AUDIT-C 95% and 85% (58). Different versions of screening tools do exist, which may influence the results. The TWEAK test has two different tolerance questions: one asks how many drinks it takes for a woman to feel “high” and the other asks how many drinks she can “hold” before passing out (54). The “high” question is more relevant to drinking patterns of greater frequency and the “hold” question is more sensitive to binge drinking patterns. It is important to acknowledge such differences and to consider which is the most appropriate for a certain population.

Screening pregnant women for alcohol use is, however, associated with some challenges. The *Guidelines for the identification and management of substance use and substance use disorders in pregnancy* (52) identify potential negative effects when assessing alcohol use by pregnant women,

including potential stigmatization or negative attitudes by health professionals as well as invasion of their privacy. Fear of judgment from health professionals and concerns about child protection may discourage women from disclosing their use of alcohol (58).


Interventions to prevent adverse outcomes of prenatal alcohol exposure

The *Guidelines for the identification and management of substance use and substance use disorders in pregnancy* (52) recommend that all women who use alcohol should be offered brief interventions from their health care provider (strong recommendation, low quality of evidence). While brief interventions are commonly used to reduce hazardous and harmful drinking in the general population, there are several other types of intervention applicable to pregnant women or women of childbearing age, depending on the scale of their drinking. These can be divided into two groups: selective or indicated prevention and universal prevention. Targeted and indicated interventions are intended to reach higher risk individuals and groups and include brief interventions, motivational interviewing, behavioural therapy (such as cognitive behavioural therapy), pharmacological interventions and motivational enhancement therapy. Universal interventions are designed to reach the general population and include media campaigns, education interventions and labelling of alcoholic products (59).

Previous research has reviewed the evidence for selective interventions for non-pregnant and pregnant women. The evidence for brief interventions in general for decreasing harmful drinking in women is not clear. While some evidence suggests they are more beneficial for women than for men (57), evidence of the opposite has also been presented (60,61). Women who are at risk of being exposed to alcohol in pregnancy (alcohol-exposed pregnancy – AEP), that is women of childbearing age who consume alcohol at risky levels and have unprotected sex, may benefit from selective interventions. A report by Barry et al. (59) found that the risk of having an AEP could be significantly reduced after motivational interviewing to decrease risky drinking and counselling for contraception. The report recommended that selective and indicated prevention should focus on women of childbearing age through

screening and brief interventions (59). The evidence on effectiveness of selective interventions for pregnant women is, however, limited. A systematic review of randomized control trials published in 2009 (62) only found four trials assessing the effectiveness of educational and/or psychological interventions for pregnant women. No conclusive evidence was found for the effectiveness of interventions, partly because of the poor quality of the studies. Gilinsky et al. (63) included randomized control trials as well as non-randomized control trials in a systematic review, published in 2011, and concluded that the quality of the evidence was poor. The review did, however, indicate that the effectiveness of interventions to reduce drinking may have the strongest effect on women who choose abstinence as their drinking goal, and on women who drink at high levels and take part in the intervention with a partner. Despite the poor quality and heterogeneity of interventions, the authors suggested that there is some evidence to suggest that a single-session brief intervention may influence women to maintain abstinence, but that more intense interventions may be required to support women who continue to drink in abstaining (63).

Universal interventions to raise awareness in the general population can have an impact on attitudes towards alcohol use in pregnancy. A Norwegian population-based study compared attitudes before and after the implementation of a nationwide campaign on the risks of drinking during pregnancy in 1984/1985. The findings showed a significant increase in agreement with the statement “pregnant women should abstain from alcohol”, from 75% in 1984 to 83% in 1990 ($P < 0.001$). In addition, there was an increase in respondents giving “possible damage to fetus” as a reason for abstinence (79% and 85% respectively, $P < 0.001$) and respondents who had come across information about alcohol and pregnancy (65% and 71% respectively, $P < 0.001$) (64). Crawford-Williams et al. (65) reviewed universal approaches to prevention in the form of educational and public health interventions. Their review, in which only a smaller number of studies were included, concluded that the evidence for these types of intervention is lacking. Individual studies found positive effects on increased awareness of risks as well as decreased alcohol consumption, but not all studies found significant results, which limited the ability to draw overall conclusions about effectiveness.

A large stack of papers and folders is shown, with a magnifying glass resting on the right side. The papers are of various colors, including white, yellow, and blue. The magnifying glass has a black handle and a black frame. The stack is placed on a wooden surface.

**[Review
methods]**

This rapid review includes studies on the effectiveness of prevention of negative outcomes from drinking during pregnancy. The main aim was to review primary studies that assessed changes in awareness and/or behaviour, which include knowledge, attitudes and alcohol consumption. Studies that assessed neonatal outcomes were not included in this review, as the focus was on effectiveness of prevention approaches on knowledge and behaviour. Studies that fitted the criteria and that also assessed birth outcomes were, however, included. Interventions targeting pregnant as well as non-pregnant women were included, as pre-pregnancy alcohol consumption is an important predictor for prenatal alcohol use (20) and reducing risky drinking before pregnancy may thus be an important prevention strategy. There were no restrictions on where the intervention was delivered (clinical or community setting) or who delivered it (researcher, doctor, obstetrician, midwife, nurse, community health worker). Studies published in peer-reviewed journals in English were considered. The search was limited to a 10-year time period from 2005 to 2015 so as to include the most recent studies in this field. Prior reviews have included studies published before 2005 (62,63,65). The databases PubMed/MEDLINE, CINAHL and PsychINFO were used to search for published studies, using the search terms listed in Annex 1. A review flowchart is presented in Annex 2. The searches were done between August and September 2015. Reference lists were also examined to identify studies that were not identified in the database searches. As this was a rapid review, the focus was on providing a descriptive narrative synthesis with the full range of studies of different types of intervention. No meta-analysis was, therefore, performed.

Inclusion criteria

Studies were included in the review if they fitted the criteria described below as regards the population studied, type of intervention, study design and outcomes:

- populations: non-treatment-seeking pregnant women or women of childbearing age;
- interventions: psychosocial interventions (such as brief interventions, motivational interviewing, individual health education, behavioural therapy) delivered in health care or community settings; and public health

interventions carried out as a universal approach (health education campaigns through various delivery modes such as multimedia campaigns, printed information, advertisements, warning labels);

- study designs: randomized control trials, randomized trials, pre-post intervention studies, cross-sectional studies, longitudinal studies, experiments, quasi-experiments;
- outcomes: changes in awareness or knowledge about risks associated with drinking, changes in attitudes, reduction in alcohol consumption, abstinence rates, or intention to abstain when pregnant.

Exclusion criteria

Studies were excluded if they were feasibility studies, that is, they were assessing the acceptability and feasibility of an intervention on the intended target populations rather than its effects. Pharmacological interventions were excluded as the focus was on psychosocial and public health interventions. Interventions that specifically targeted post-partum alcohol use were excluded. This report focuses on brief interventions to prevent alcohol consumption in the general population of pregnant women, thus studies of alcohol-dependent women, who would require more intensive treatments, have been excluded. (Alcohol dependency was, however, included as a search term to broaden the search and ensure that nothing was missed). This distinction is drawn in the *Guidelines for the identification and management of substance use and substance use disorders in pregnancy* where, as per recommendation 2, all women who drink should be provided with brief interventions and, as per recommendation 3, women with substance use disorders should be provided with individualized care. Studies focusing on interventions in women with pre-existing medical conditions were excluded. The exception was a study of women undergoing *in vitro* fertilization (IVF) treatment (66), as that specifically relates to health behaviour around and during the time of pregnancy. Finally, the review focused on women of childbearing age (commonly defined as 15–44 years), but studies that specifically focused only on teenage pregnancies, where the sample included only women in their teens, were excluded.

[Results of the review]



Twenty-nine papers were included in the review. Thirteen included approaches to prevention in non-pregnant women and 16 regarded pregnant women. The following two sections will summarize the findings divided into these two groups of studies.

Interventions aimed at women who may become pregnant

Summary of included studies

Thirteen studies were included that focused on preventing exposure to alcohol in pregnancy from a pre-conception perspective and wider interventions to increase awareness to prevent exposure to alcohol in pregnancy (67–79). The studies are summarized in Annex 3 (Table 3.1). Eleven studies were conducted in the United States and two studies were conducted in South Africa (67,79). Four studies recruited women from wider community settings (68,71,72,75), two studies recruited women from a college student population (69,74), two studies recruited women who were American Indian (73,78) and American Indian/Alaskan Native (76), one study recruited women attending women, infant and child clinics (70), one study recruited from a variety of settings (including college and community settings) (77), one study recruited women living in a rural area where most women worked in commercial agriculture (67) and one study used birth records included in a retrospective design (79). Two studies looked at the effects of wider awareness campaigns on non-pregnant women (78,79). One study explicitly excluded women who reported drinking more than 20 drinks per week (70) and one study excluded women who were opioid-dependant (75).

Summary of results

One study did not specifically define women as at risk of having an AEP, but included women who could get pregnant and were drinking at risky levels defined as three drinks or more per occasion in the last month (70). Three studies defined those at risk of an AEP as women who in the last 90 days had had vaginal intercourse with a male partner without effective contraception, and who had a risky drinking pattern of three drinks or more per occasion or a weekly average intake of seven drinks or more (71,75,77). Two studies defined risky drinking (as part of the risk of an AEP) as five drinks or more per occasion or eight drinks or more per week in the last 90 days, and the same measure regarding sexual behaviour (72,74). One study defined risky

drinking as five drinks or more per occasion or seven drinks per week in the last 90 days (67), and one used the definition of four drinks per occasion or seven drinks or more in the last 90 days (69), still using the same contraception use measure. In the remaining studies, the risk of an AEP was defined as vaginal intercourse without effective contraception and risky drinking of three drinks or more per occasion or eight drinks or more in the last two weeks (76), vaginal intercourse without effective contraception and any alcohol use in the last 90 days (73), and vaginal intercourse without effective contraception in the last four months and any alcohol use in the last 30 days (68).

The interventions varied in intensity and length (Annex 3, Table 3.1). Some were as short as 20 minutes (76) whereas more intense motivational interviewing interventions included four 45–60 minute sessions as well as an additional contraception counselling session (72). Five of the studies included the Changing High-Risk Alcohol Use and Improving Contraception Effectiveness Study (CHOICES) intervention, the birth control and alcohol awareness: negotiating choices effectively (BALANCE) intervention, and a shortened version of BALANCE without contraception counselling (EARLY) intervention (69,71,72,74,75). Three were adapted from the CHOICES intervention (67,73,77), which was developed with support from the United States Centers for Disease Control and Prevention with a focus on altering both drinking behaviour and contraception use among non-pregnant women. This intervention includes four sessions of motivational interviewing as well as contraception counselling (59). Briefer versions of CHOICES have been developed to facilitate implementation and delivery, where BALANCE and EARLY both include a single session of motivational interviewing but EARLY does not include contraception counselling (75). Of the remaining three studies, two included adapted versions of e-Check Up to Go (e-CHUG), originally developed for college students (70,76), and one was an intervention using tailored motivational messaging (68).

Four studies that used a randomized control design showed significant results on AEP risk from the intervention (67,69,72,74). In their study of the BALANCE intervention, Ingersoll et al. (74) found a significant reduction in the risk of AEP in the intervention group compared to the control group at one month follow-up. Ceperish et al. (69) also found a reduction following the BALANCE intervention group, significantly more compared to controls at four months post-intervention. Another intervention, based on CHOICES (67), found that at three months post-intervention significantly fewer women were at risk of an AEP compared to the control group, an effect that was still significant at 12 months. The odds of not being at risk of an AEP were twice as great for women in the intervention group as for the controls (67).

The effects of the intervention were, however, less convincing in other studies. Ingersoll et al. (75) compared women who received the EARLY intervention to a group provided with an information video and another group who received a leaflet. Reductions in the risk of an AEP were evident in all three groups at three and six months, but the EARLY group had the largest reductions at last follow-up. Overall, however, the sizes of the effects for the different interventions were small, ranging from 0.16 to 0.41. Furthermore, two studies – an adapted version of the CHOICES intervention (73) and the e-CHUG intervention (76) – showed reductions in the risk of an AEP which were significant over time, but no significant difference was found between treatment conditions (76) or between follow-up points (73). Similarly, Wilton et al. (77) found a significant reduction overall in the risk of an AEP at six months, following the Healthy Choices intervention (adapted from CHOICES and Healthy Mom’s Study). There was no significant difference between women who received the intervention in person or over the telephone.

An interesting aspect, which was noted in two studies, is whether women will change only one kind of behaviour to reduce their risk of having an AEP. Floyd et al. (72) found that at nine months post-intervention women in the intervention group were more likely to have reduced risky drinking *and* used effective contraception. Women in the intervention group were, however, slightly more likely to have changed their contraception use compared to the control group, and women in the control group were more likely to have reduced risky drinking. Further analysis showed that women in the intervention group were more than twice as likely to be using effective contraception at three, six and nine months follow-up, and were also significantly more likely to have reduced their risky drinking at all follow-up points (72). Rendall-Mkosi et al. (67) found no significant difference in risky drinking at 12 months follow-up, although overall there was a significant reduction in AUDIT. As regards contraception, there was a significant reduction in women who were not using effective contraception, with significantly more women in the intervention group using effective contraception at three and 12 months (67).

Two studies assessed the impact of wider public health education on preventing exposure to alcohol in pregnancy (78,79). Chersich et al. (79) conducted a study in South Africa, following a universal prevention approach in South Africa with the aim of changing social norms through a range of advertisements and information in the media as well as through health care. A random sample of mothers of half of all children born within a one-year period was invited to participate in the study. This retrospective design allowed the researchers to assess whether the campaign had an impact on the use of alcohol in pregnancy as they looked at changes in maternal alcohol use, knowledge of risks and

diagnoses of FAS/pFAS. The study found a significant decrease of FAS/pFAS cases following the intervention, as well as in alcohol consumed per week. There was also a significant increase in women who had been provided with information by nurses and who had seen or heard about alcohol and pregnancy on the radio or television (TV) (79). Another campaign, in the United States, which included posters, advertisements over the radio and brochures, was tailored to American Indian women. The results showed that in the self-selected convenience sample of women of childbearing age, the majority believed that the campaign was culturally appropriate and felt that it had increased their knowledge about FAS as well as about the risks of drinking in pregnancy in general. The majority reported that they had reduced their drinking as a result of the campaign. These results were, however, based on subjective perceptions rather than an alcohol screening tool, and no pre/post campaign measures were presented.

Interventions aimed at pregnant women

Summary of the studies included

Sixteen studies that included interventions focusing on reducing alcohol use in pregnancy or raising awareness in pregnant women were included (66,80–94) (summarized in Annex 3, Table 3.2). Nine studies were conducted in the United States (66,81–83,86–88,90,93), three in Sweden (80,84,92), one in Australia (94), one in South Africa (85), one in Ireland (89) and one in the Netherlands (91). Eight studies recruited any women who presented to antenatal care or related maternity services (80,83–85,87–89,92), five studies specifically included pregnant women identified as consuming alcohol (81,82,86,90,91), and the study which included women undergoing IVF treatment included women consuming alcohol at risky levels (seven drinks or more per week or three drinks or more per occasion) (66). One study looked at the impact of a wider campaign targeting pregnant women (93) and another explored the impact on pregnant and non-pregnant women of the framing of messages about drinking in pregnancy (94). Five studies, of which one (82) included a subset from a wider study (81), explicitly excluded women who were dependent on alcohol or receiving treatment for alcohol (or other substance) abuse (66,81,82,88,89).

Summary of results

The outcomes of interest in the included studies were whether the interventions encouraged women to abstain from alcohol, or whether they had an impact on reported

alcohol use. Three studies had abstinence as an outcome measure (80,82,86). Bortes et al. (80) found that women who received the intervention (an information leaflet about alcohol and pregnancy prior to their first antenatal visit) were more likely to be abstinent than the control group. Furthermore, O'Connor & Whaley (86) found that women who received a single-session brief intervention (10–15 minutes) were five times more likely to be abstinent at follow-up in the third trimester than the control group. Chang et al. (82) also had abstinence as an outcome measure, but all participants in the study had screened positive for alcohol use (T-ACE-positive, any drinking in the last three months, one drink or more per drinking day in the last six months, or drinking in a previous pregnancy). In this study, the importance of goal selection was investigated. At the time of enrolment, women set their drinking goals as either abstinence or to cut down their drinking. Of the women who drank at the time of enrolment, half were abstinent at follow-up when their goal was abstinence compared to none among women whose goal was to cut down on their drinking. Of the women who were abstinent at the time of enrolment (but had screened positive on any of the drinking measures) and had abstinence as a goal, the majority remained abstinent (82).

Two studies looked at the influence of wider campaigns about alcohol and pregnancy on pregnant women and the framing of messages on alcohol and pregnancy (93,94). France et al. (94) investigated the influence of the framing of alcohol and pregnancy messages on pregnant and non-pregnant women's intentions and confidence in their ability to abstain or reduce drinking in a current or future pregnancy. A self-efficacy message was associated with a higher intention to abstain compared to the control condition, whereas significantly more women in the threat appeal group intended to abstain compared to the self-efficacy and control messages. The study found that a combined approach of threat and self-efficacy was also related to a higher proportion of women intending to abstain compared to a self-efficacy and control approach. Threat and combined messaging was also related to higher levels of perceived confidence in the ability to abstain from alcohol. Framing of messages around alcohol and pregnancy may, as this study suggests, have an impact on behaviour, although this study did not follow up whether women's behaviour was consistent with their intentions. Lowe et al. (93) found that following a multimedia intervention, in which information was presented in several different ways, more women who received the intervention had talked to at least one of their friends about alcohol and pregnancy. Women in the intervention group also increased their knowledge post-intervention on a set of four questions of risks with prenatal drinking compared to controls.

In relation to the impact of interventions on alcohol use during pregnancy, several studies found no difference between the intervention group and the control group on drinking outcome measures (83,84,88,89,92). In addition, Osterman et al. (87) found that both intervention and control groups significantly reduced their AUDIT scores from baseline, and Tzilos et al. (90) found an overall decrease in the number of women who drank at follow-up compared to baseline. Both groups reduced their drinking significantly from baseline but the difference between the groups was not significant. In both these studies, the control group received some written information regarding alcohol and pregnancy in addition to the baseline assessment.

Several studies did, however, find a significant effect from the intervention on reduced alcohol use among pregnant women. Rossi et al. (66) included women who were undergoing IVF treatment and reported at-risk drinking (drinking above the recommended limit of seven drinks or more per week or three drinks or more per occasion) or screened positive on T-ACE. The findings indicated that the intervention group significantly reduced their intake per drinking day compared to the control group. Marais et al. (85) found that women in both the intervention and control groups reduced their AUDIT score at 4.5 months follow-up, but the AUDIT score at follow-up was significantly lower among women who received the intervention. When dividing women into groups depending on their level of drinking, Chang et al. (81) found that women who were drinking at higher levels when they enrolled in the study reduced their drinking more following a brief intervention in person. However, van der Wulp et al. (91) found that their computer-tailored intervention was associated with significant reductions among women who drank one SD below the mean, but not among women who drank one SD above the mean.

Finally, two studies focused specifically on including the pregnant woman's partner in the intervention. Chang et al. (81) found that the intervention had a greater effect on women drinking at higher levels when their partner took part, both on a reduction in the number of drinks per drinking day and combination of drinks per drinking day and on the percentage of drinking days. Högberg et al. (84) investigated the effect of an intervention which included a dialogue about alcohol from a life-cycle perspective in which the partner took part. While the study showed significant differences in reported alcohol consumption during pregnancy, there was a significant difference in support from the partner. Women in the intervention group were twice as likely to report that their partner always offered them non-alcoholic options compared to the control group (84).



[Discussion]

This rapid review has presented an overview of studies from the last decade on different approaches to the prevention of exposure to alcohol in pregnancy. While there are still many areas of this research that need further investigation before strong conclusions can be drawn on the effectiveness of interventions to impact attitudes and behaviour related to alcohol use during pregnancy, there are many important learning points.

Women drink more than they used to, and alcohol marketing has found a way to target women with their products and promote drinking to women (95). Wider population approaches that have an impact on overall consumption (96) will also have an impact on levels of consumption among women. In addition to wider alcohol policy, this review has indicated that prevention specifically targeting women of childbearing age and pregnant women can have an impact on preventing or reducing exposure to alcohol in pregnancy.

Women appear to benefit from interventions such as motivational interviewing, focusing on reducing drinking and increasing contraception use. Reaching women in sexual health clinics provides a great opportunity, as there was evidence that interventions had an impact on contraception use, however the impact was less on risky drinking (67,72). While reducing risky drinking can bring health gains in general and decrease the risk of alcohol exposure in pregnancy, promoting effective contraception among women can prevent an AEP. There was, however, evidence that interventions that target both of these forms of behaviour do indeed reduce the risk of having an AEP (67,69,72,74). While there is limited evidence as regards wider public health education (65), giving consideration to the framing of messages about drinking in pregnancy and providing tailored information may encourage women to abstain or reduce drinking if or when they become pregnant.

Several studies found that interventions for pregnant women can have an impact on reducing drinking compared to controls. However, the lack of significant differences between intervention and control groups as both groups reduced their drinking introduces questions regarding the effects of assessment of alcohol habits. Especially in maternity services, this may be an important finding. The *Guidelines for the identification and manage-*

ment of substance use and substance use disorders in pregnancy (52) advise that all women should be screened for alcohol use. If screening has an impact on its own, and a brief intervention can further encourage behaviour change, effective screening and brief intervention programmes in maternity services are an essential area for prevention. Since the evidence is not clear on best practice in terms of screening tool, outcome measures and types of intervention, more research is needed on these topics.

Limitations

This rapid review has several limitations that need to be acknowledged for interpreting the findings. The majority of studies were conducted outside the European Region. Differences in levels of alcohol use and levels of harm between, for example, the United States and different countries in the Region limit the applicability of interventions to a European context. A variety of outcome variables were used to assess outcomes, which limits the ability to compare across studies. Some studies were relatively small and interventions varied from as little as five minutes to over 60 minutes, with some interventions carried out over several sessions. The mode of delivery also differed: while some interventions were delivered by a researcher or health professional, others used computerized or remote delivery which may have different impacts on different populations (non-pregnant vs. pregnant).

One major limitation was that many studies suffered from high attrition rates – a particular problem in several studies including pregnant women. Overall the attrition rates varied from 0% to as high as 41% at the last follow-up. Few studies were designed to attempt (where possible) to blind participants and researchers to assigned study conditions. All studies relied on self-reports of alcohol use, for which social desirability is a potential issue and women may not have reported their actual levels of drinking. Finally, among the few studies that included wider public health interventions, several measured the intention to abstain or reduce alcohol consumption, or subjective changes in knowledge or reduced drinking (78,79,94), which limits the ability to draw conclusions from this small sample of studies on actual behaviour change.



[Case studies]

This section presents prevention work from eight Member States as a follow-up to work outlined in the timelines of the 2013 *Status report on alcohol and health in 35 European countries (97)*. Member States were contacted in September 2015 and asked to provide information about FASD-related activities over the previous five years, following on from the Status report. In order to highlight the range of different FASD-related activities in the EU and the Region, profiles of selected countries are featured in this report. Further information can be found in the Status report. These case studies indicate steps taken by individual Member States to prevent harm caused by exposure to alcohol *in utero* and show that a wide range of activities have been undertaken in the Region, including advocacy for national policy, strengthening of the identification and management in maternity care of women who drink, as well as wide-reaching awareness campaigns. Sharing of good practice within the Region is an important factor in developing prevention in this area, together with use of the evidence base to ensure that practice is informed by updated and effective methods.

Finland – Focus on clinical practice

The prevalence of alcohol use and the amounts consumed have increased in Finland. Among women of fertile age, 90% drink alcohol. Reliable recent estimates of the prevalence of FASD in Finland are not available. Awareness of the risks of alcohol-related birth defects among the general population in Finland is above the EU average, but it remains a challenge to reach women before they plan for pregnancy or before having an unplanned pregnancy.

Targeted policies have been developed addressing alcohol through maternity health services. Free maternity clinics are used by nearly 100% of pregnant women, with a maternity package containing baby clothes and care products an important incentive to present for early check-up. This is an important prerequisite for a successful screening and advice approach.

Screening is widely used by maternity clinics around the country. In 2014 the proportion of clinics using the AUDIT test or a comparable screening tool was 87%. Specialized clinics are available for pregnant women identified as having an alcohol or drug abuse problem, with both in- and out-patient treatment options available. In addition, residential mother and child services help mothers stay free of alcohol and/or drugs during pregnancy and reinforce a positive mother-child interaction after birth. Fathers are increasingly

being involved. In cases of severe alcohol or drug dependence, involuntary treatment can be endorsed on a legal basis. Health professionals in particular have a duty to inform child welfare authorities if the development of a newborn or a child may be endangered by, for example, a woman's prenatal at-risk use of alcohol.

The work of alcohol prevention in maternity care is addressed in clinical guidelines. A specific section on alcohol and pregnancy is included in the 2010 *Clinical guidelines on the treatment of alcohol use disorders (Alkoholiongelmaisen käypä hoito)* published by the Finnish Medical Society Duodecim. Furthermore, the 2013 *Clinical guidelines for maternity clinics* include steps and key messages to prevent alcohol-related harm, including that:

- alcohol-related risks among women of childbearing age and their spouses should be raised at an early stage when they contact health services;
- all clients of maternity clinics should be asked about their alcohol consumption;
- the AUDIT tool is recommended for assessing the alcohol use of pregnant women and their partners;
- drinking to drunkenness is advised against when a pregnancy is planned;
- giving up alcohol is advised at the latest when a pregnancy is confirmed.

Finland

Organizations/institutions involved

National Institute for Health and Welfare, the Finnish Medical Society Duodecim, the Hospital District of Helsinki and Uusimaa, the A-Clinic Foundation (nongovernmental organization), the alcohol retailing monopoly chain Alko, the Federation of Mother and Child Homes and Shelters (nongovernmental organization), the Finnish Association on Intellectual and Developmental Disabilities (nongovernmental organization).

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Germany – Guidance, policy and FASD awareness

A national pilot project to increase alcohol and tobacco counselling for women during pregnancy has been initiated, with a specific focus on women at risk. The funding priority started in March 2011 with seven annual projects. In 2012 the second phase was rolled out with three biannual projects for a supranational transfer of the best approaches. Successful implementation has been guided by evaluation.

Several guidance and policy documents have been published and adopted, including;

- *National Strategy on Drugs and Addiction Policy* (see chapter on alcohol, goal 6);
- *Recommendations for parents dealing with their children and alcohol: scientific knowledge, the National Strategy on Drugs and Addiction Policy*;
- *S3 medical guidelines for fetal alcohol syndrome diagnoses* (long and short versions);
- pocket guide *Think Kids. Don't drink. Stop FASD* created by TESS-Ambulance Munich, which supervises children at risk after "toxin exposure in pregnancy".

National campaigns, specifically on FASD as well as on alcohol-related harm in general, have been organized. A national awareness week is organized every two years. In 2015, this ran for the fifth time with the focus *Alcohol? Less is better*. A national school pilot project to prevent FASD was implemented in April 2015 and will run until March 2018. In October 2015, a national project was finished, which developed and implemented a mobile FASD exhibition called *Zero*. Finally, several activities have been implemented in the health services to strengthen FASD prevention, including the use of a new "FASD puppet" to improve FASD prevention for experts, teachers, educators and other people interested in the area. Several information leaflets are available for pregnant women and their partners through the Federal Centre of Health Education and the German Centre for Addiction Issues, with information about alcohol consumption during pregnancy.

Germany

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Lithuania – Mobilization of FASD awareness

Several events have been organized during the last couple of years to raise awareness about FASD. The Lithuanian Medical Students' Association, the national Drug, Tobacco and Alcohol Control Department, Vilnius University Faculty of Medicine and the Human Genetics Society of Lithuania in Vilnius organized events in relation to Fetal Alcohol Syndrome Day on 9 September in 2012 and 2013. During these events, information about the harms caused by drinking during pregnancy was disseminated through leaflets, posters, broadcasts and quizzes. The Lithuanian Medical Students' Association, in conjunction with the Parliamentary Drug and Alcohol Addiction Prevention Commission, the Drug, Tobacco and Alcohol Control Department, the National Tobacco and Alcohol Control Coalition and Vilnius City Municipality, organized the event *Mom, I want to be born sober* in 2013 and 2014 in Kaunas, in 2014 and 2015 in Vilnius and in 2016 both in Kaunas and in Vilnius. This event involved inviting passers-by to participate in a quiz with medical students and representatives of governmental or nongovernmental institutions and organizations.

Since 2013 it has been a requirement to examine the health of the pregnant woman during the second visit (before the twelfth week of pregnancy) (Order No. V-900 "For pregnant women, maternal and neonatal health care") and to discuss various factors, including addiction. Women who display risk factors are referred for consultation or directed to secondary B level institutions. During the implementation of the Lithuanian-Swiss cooperation programme in 2015, aimed at improving perinatal and neonatal services, these factors included alcohol, smoking and drugs during pregnancy with

the information that there is no safe amount of alcohol consumption during pregnancy. In 2014, the first Baltic conference on prenatal alcohol use prevention was held in Parliament. The conference was attended by experts in the field from the National Institute of Alcohol Abuse and Alcoholism, the Health Economics Institute (Canada), WHO and speakers from the Baltic countries and the Netherlands. Both in 2015 and 2016 press conferences were organized in Parliament on the subject.

The Republic of Lithuania Law on Alcohol Control No. I-857, Article 9, will be amended and come into force on 1 November 2016. According to the amendment, warning labels will have to be placed on alcoholic beverages for sale, stating that alcohol use in pregnancy can cause harm to the unborn child.

Lithuania

Organizations/institutions involved

The Lithuanian University of Health Sciences Health Research Institute, the Lithuanian Medical Students' Association, Drug and Alcohol Addiction Prevention Commission in Parliament, WHO Country Office, Lithuania, the Drugs, Tobacco and Alcohol Control Department, the National Tobacco and Alcohol Control Coalition, the Human Genetics Society of Lithuania.

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Luxembourg – National campaigns and focus on health services

Since 2013, a public health campaign called *No alcohol during pregnancy and breastfeeding* has been developed and implemented by the Ministry of Health. The campaign targeted the general public, with specific attention to women who were planning to get pregnant or who were pregnant, as well as health professionals. The aim of the campaign was to give information about the potential damage

from alcohol consumption during pregnancy and while breastfeeding. The main message communicated was that FAS is 100% preventable. Bilingual campaign materials were developed, including posters and brochures, and the campaign was also made visible on the national health portal webpage and on Facebook. Recommendations for health professionals were developed and distributed widely to health professionals such as medical doctors, midwives and pharmacists.

Luxembourg

Organizations/institutions involved

The Ministry of Health maternity services, National Midwives Association, National Administration Department for Family Allowances, National Addiction Prevention Centre, several national associations active in counselling, consulting and education training for pregnant women and young parents.

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Norway – Focus on health services and successful national campaign

In 2005, the report *Alcohol and pregnancy* and the guidelines for pregnancy care were published. The report included the recommendation for no alcohol during pregnancy. The government *National Action Plan on Alcohol and Drugs* was published in 2007, following on from the 2005 report by requesting the Directorate of Health to provide information about alcohol in pregnancy and to introduce screening for pregnant women. Screening is included in training programmes for midwives and general practitioners, using a Norwegian screening instrument which combines questions from TWEAK and AUDIT-C. In addition, a training programme has been implemented in Norway called “Tidlig inn” (brief intervention) for health and social workers in municipalities. The programme includes a module on alcohol

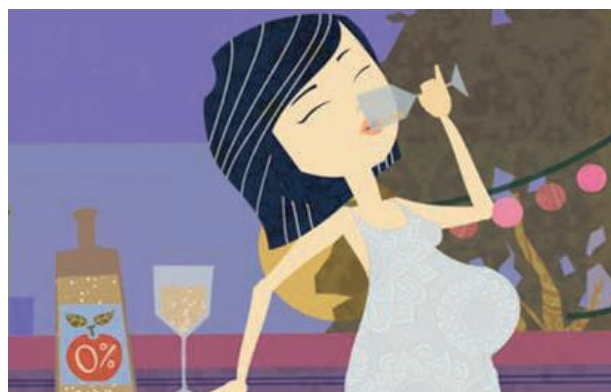
in pregnancy and how to apply motivational interviewing in contacts with pregnant women. This programme is widely disseminated by competence centres around the country.

Following the National Action Plan, a national media campaign (example in Fig. 2) was rolled out in 2007 and ran annually between 2009 and 2013 and on a smaller scale in 2014 and 2015. The aims were to:

- inform women/couples of childbearing age about the recommendation from the health authorities and raise awareness about the risks for the baby if the mother drinks;
- change attitudes and behaviour among women/couples;
- encourage women/couples to make an informed decision according to the recommendation; and
- change social norms from acceptance of drinking in pregnancy to support of the “no alcohol in pregnancy” message”.

The campaign included several elements, including letters with information leaflets and posters to all general practitioners, gynaecologists and municipal health centres. Contacts with journalists and medical experts were also established, resulting in many news articles in the media. Advertisements were placed on Google and in magazines and newspapers, and web banners were placed on pregnancy websites. Three versions of a short film called *Snart mamma (Becoming a mum)* were produced and broadcast on TV, in cinemas and on YouTube. The campaign was honoured with the highest award in its class at the *SABRE Awards* and also received the *Diamond SABRE Award*. The campaign appears to have changed attitudes towards drinking in pregnancy as survey data from the general population show that in 2013, for example, 20% of people thought that pregnant women could drink some alcohol with dinner, compared to 40% in 2009.

Fig. 2. Picture from the Norwegian national Alcohol-free Pregnancy campaign



A pilot project was carried out in 2012–2014 in Rogaland County to test early consultations on alcohol and lifestyle habits by midwives at health centres, where women were offered an additional consultation before their first appointment. The consultation was based on counselling style motivational interviewing and included assessments using TWEAK. A booklet was compiled for health professionals during the project to support and harmonize the consultation (available in Norwegian and English). The project was evaluated by the International Research Institute of Stavanger, which found that women and midwives were very content with the consultation and would recommend it to others. The outcome will be assessed in the next revision of the guidelines for pregnancy care, and some municipalities continued to carry out the consultation after the project ended. Finally, Borgestad Competence Centre/KoRus Sør arranges an annual conference called “Barnet og Rusen” (The Child and Intoxication), which focuses on alcohol-related harm to children. The centre is an institution with a high level of competence in substance abuse which offers consulting, information material and courses to communities, health personnel and caregivers.

Norway

Organizations/institutions involved

Norwegian Medical Association, Norwegian Association of Midwives, Norwegian Nurses Organization and the Regional Competence Centres (Kompetansesenter Rus), charities, nongovernmental organizations, advocacy groups, government.

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Poland – Raising awareness and advancing science

The campaign “Pregnancy without alcohol” was launched in 2007 and has continued to run in local governments in Poland since then. The campaign includes the dissemina-

tion of a wide range of information such as posters, leaflets, publications and advertisements on TV and the radio. In addition, a website was created with digital information about the campaign as well as the written materials.

A film was produced in relation to a research project conducted by Professor Urbanik, which used magnetic resonance imaging and proton spectroscopy. The film presents the pioneering achievement of Polish scientists in analysing the changes in brain chemistry of children who have been exposed to alcohol *in utero*, and also the impact of brain damage on how children function. The film was shown at a national conference as well as several international conferences.

A research project has been developed to improve the evidence on the prevalence of FASD. This project aims to estimate the prevalence of FASD in children and develop an effective diagnostic tool. The results indicated that the prevalence of FASD in Poland is 20 per 1000 live births, including 4 in 1000 with the diagnosis FAS. The Comprehensive Centre of Diagnosis and Therapy of Children with FASD has opened at the St Louis Regional Specialized Children's Hospital in Cracow, which operates under the National Health Fund. The focus has been on diagnostic standards for FASD and training in diagnostic terms for doctors and psychologists. Further work is under development for assessing and measuring facial dysmorphism using 3D devices.

Poland

Organizations/institutions involved

Local government and nongovernmental organizations.

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Slovenia – Wide-reaching awareness campaigns

A pilot project on alcohol and pregnancy was developed and carried out in 2013/2014 in the south-western Gorenjska

Region, one of the nine regions in Slovenia. The project was initiated by the National Institute of Public Health in cooperation with local paediatricians and gynaecologists/obstetricians, with financial support from the Ministry of Health. It aimed to raise awareness of the hazardous consequences of alcohol to the unborn child and encourage women not to drink alcohol when planning to get pregnant, during pregnancy or when breastfeeding. The project included: (i) a survey of attitudes towards the use of alcohol in pregnancy and during breastfeeding among women and their partners attending future parents groups; (ii) a one-day expert meeting covering a range of topics to empower health professionals to raise awareness among women of childbearing age; and (iii) raising awareness in the general population and among women of childbearing age using leaflets entitled *For the best start (Za najboljši začetek)* and a poster, *No alcohol for the two of us, please! (Za naju brez alkohola, prosim!)*. These were distributed to places such as health institutions, pharmacies, higher education institutions, social work centres and libraries. The project was presented at the third European conference on FASD in Rome 2014. This pilot project will be used as a starting point for the development and implementation of the approach in all nine regions.

In 2014, activities were organized on Fetal Alcohol Syndrome Day. Focus was on the key message “No safe amount of alcohol, no safe alcoholic beverage and no safe time to drink alcohol during pregnancy”. This was emphasized by the National Institute of Public Health, which also stated that abstinence is the best and safest advice for pregnant and breastfeeding women. Support from partners and people around the women was also stressed. The Utrip Institute presented preliminary results of a web survey in a population of women of childbearing age and pregnant women, as well as among health workers and introduction of the international campaign “Too young to drink”. On Fetal Alcohol Syndrome Day in 2015 the same key message was emphasized and posted on websites of institutions and organizations. The leaflet *For the best start (Za najboljši začetek)* was distributed and a Slovenian version of the Norwegian film *Snart mamma* was broadcast on YouTube and on TV. A one-day event with information booths was organized in eight regions. No Excuse Slovenia organized a national seven-day social media activity (Facebook and Twitter) which spread the message using the hashtag #nepijemza.

Workshops and lectures were organized in 2014/2015, including the one-day expert meeting in one region (see above), short lectures for health workers in some other regions, a presentation at the Meeting of the Association for Perinatal Medicine Slovenia, a short lecture for students of health care and a workshop for activists from nongovernmental organizations. Several written materials have been produced on the topic of alcohol and pregnancy, including the leaflet *For the best start*, a chapter in a university text-

book on clinical nutrition in pregnancy (2015) and contributions in popular magazines.

Finally, work is continuing to improve the response of the health services. Gynaecologists play an important role in the framework of an interdisciplinary approach towards tackling hazardous and harmful alcohol drinking among Slovenian adults through connecting the health and social sectors. Future work will include developing a screening and brief intervention protocol, training for professionals and piloting the approach in all nine health regions. In autumn 2016, materials designed to prepare expectant parents for childbirth and parenthood will be published online for use in future parent groups (childbirth education classes). These will include written materials about different topics connected with alcohol in pregnancy and postpartum for health providers, articles for pregnant women and fathers-to-be and a shorter version of the informational/educational material for future parents. Alcohol will be integrated into the contents of the first and second meetings during pregnancy, designed for both future parents. The first meeting is planned in the first trimester of the pregnancy.

Slovenia

Organizations/institutions involved

The National Institute of Public Health Slovenia, No Excuse Slovenia, Ministry of Health, Institute Utrip.

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Sweden – Focus on support for individuals affected by FASD

In 2009, the Swedish National Institute of Public Health published the systematic literature review *Low dose alcohol exposure during pregnancy – does it harm?*, which provided an overview of the evidence about consumption of small amounts of alcohol during pregnancy. The National Board of Health and Welfare, in collaboration with the National Agency for Special Needs Education and Schools,

has developed endorsement material for kindergartens and preschools on children suffering from FAS/FASD and, at the request of the National Board, the Swedish Family Care Competence Centre has published an evaluation of knowledge on the subject. A cost of illness analysis of FAS has also been published by the Centre. Activities have been undertaken as regards education. For example, around 40 key individuals (medical doctors and nurses) in the country have taken part in training courses on alcohol and pregnancy in cooperation with the Centre of Competence for FAS at Sørlandets Hospital in Norway. These courses also gave the professionals an opportunity to discuss how to bring back the knowledge gained to their home settings so as to develop their work. The Swedish Agency for Health Technology Assessment and Assessment of Social Services Work planned to evaluate knowledge of methods to investigate, diagnose and support children with FAS/FASD in several areas during 2015. This included mapping the availability of support to parents and their infants by the National Board of Health and Welfare, and an in-depth study on collaboration between different actors who come into contact with children born with alcohol injuries. Work to estimate the prevalence regarding FAS/FASD is being planned. The National Board supports the follow-up of target group-oriented child health care at Rosenlunds Hospital under Stockholm County Council for mothers that have had addiction problems during pregnancy. Children are followed up until school age. The Board has also supported the production of material for a regional clinical pilot action with the professional competence to investigate, diagnose, habilitate and follow up children with birth defects suggestive of exposure to alcohol or drugs *in utero*.

Sweden

Organizations/institutions involved

The National Board of Health and Welfare, the Swedish National Institute of Public Health, the Swedish Family Care Competence Centre, Swedish Agency for Health Technology Assessment and Assessment of Social Services, the Centre of Competence for FAS at Sørlandets Hospital in Norway, the National Agency for Special Needs Education and Schools.

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A close-up photograph of two young women laughing joyfully outdoors. The woman on the left has long dark hair and is wearing a black top. The woman on the right has light brown hair pulled back and is wearing an orange and red patterned top. They are both smiling broadly, showing their teeth. The background is a soft-focus green, suggesting foliage. In the bottom foreground, the rim of a clear glass is visible.

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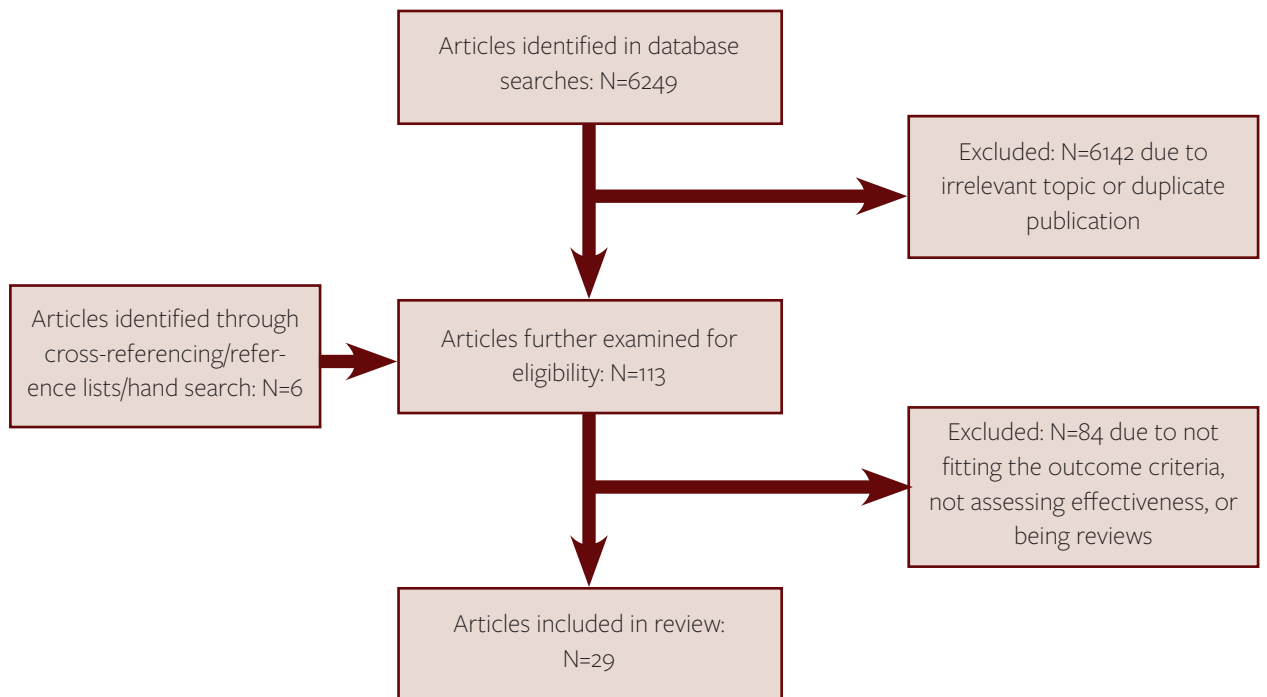


[Annexes]

Annex 1. Search terms

- Pregnant
- Prenatal
- Antenatal
- Maternal
- Alcohol/alcohol consumption/alcohol drinking/ alcohol dependence
- Risky drinking
- Heavy drinking
- Intervention
- Brief intervention/alcohol brief intervention
- Public health
- Health promotion
- Health education

Annex 2. Review flow chart



Annex 3. Overview of studies included in the review

Table 3.1. Summary of included studies to prevent AEPs

Reference	Study population	Study design	Type of intervention	Main outcome measures	Main findings
Ceperich & Ingersoll (2011) (1)	228 non-pregnant women aged 18–24 years at a Mid-Atlantic university, United States.	Randomized control trial	BALANCE intervention; face-to-face single session (60–75 minutes) motivational interviewing with personalized feedback about risky drinking and pregnancy risk. Follow-up at 1 and 4 months. Control group received information only.	Risk of having an AEP: in last 90 days risky drinking (4 drinks or more per occasion at least once, or 7 drinks or more per week), and intercourse without effective use of contraception.	At baseline all women were at risk of having an AEP. At 4 months, 20.2% of women who received the intervention and 34.6% of controls were still at risk of having an AEP ($P < 0.02$). There were no significant differences in reductions in risky drinking or uptake of effective contraception use.
Chersich et al. (2012) (2)	106 non-pregnant women (post-partum) with infants in Northern Cape, South Africa.	Cross-sectional cohort study	One-year universal awareness campaign about FASD, including local media advertisements, information in the community and information provided in health care settings.	FAS/pFAS prevalence, knowledge of risks with drinking in pregnancy, maternal alcohol use (timeline follow-back).	Significant decrease of FAS/pFAS cases following the intervention (8.9% to 5.7%, $P = 0.002$). Alcohol use in pregnancy was only assessed for a smaller sample before and after the intervention, specifically diagnosed FAS/pFAS. Median units per week declined from 14.9 units to 5.8 units ($P = 0.04$). Knowledge and exposure to information about FASD increased in the case and control group of women in the post-intervention group. The proportion of women who got information from nurses increased from 66.7% to 81.3% ($P = 0.04$); 60.7% received information from radio or TV compared to 39.5% pre-intervention ($P = 0.02$), and 87.0% believed that posters on harms of drinking could prevent women from drinking alcohol, an increase from 65.2% ($P = 0.01$).

Table 3.1 contd

Reference	Study population	Study design	Type of intervention	Main outcome measures	Main findings
Delrahim-Howlett et al. (2011) (3)	150 non-pregnant women aged 18–44 years in California, United States.	Randomized control trial	Adapted version of e-CHUG, including web-based intervention with personalized feedback, compared to general health information. Follow-up at 1 and 2 months. Control group received general, non-personalized feedback and information.	Risky drinking (3 or more drinks on one occasion in the last 30 days).	There was no significant difference in reduction of risky drinking occasions at 1-month follow-up between the intervention group (72%) and the control group (68%), ($P = 0.634$). While there was a sustained reduction in risky drinking occasions at 2 months (77%), there was no significant difference between the two groups ($P = 0.795$). Overall, there was no significant difference in any drinking measures between the two groups.
Farrell-Carnahan et al. (2013) (4)	44 non-pregnant women aged 18–44 years in Virginia, United States.	Prospective intervention study (pilot)	EARLY remote (60 minutes) single-session motivational interviewing delivered over telephone. Follow-up at 3 and 6 months.	Risk of AEP: in last 90 days risky drinking (3 drinks or more per occasion at least once or 7 drinks or more per week) and intercourse without effective use of contraception.	At baseline all women were at risk of having an AEP. There was a significant reduction in women at risk of having an AEP to 68.5% at 3 months and such a reduction was sustained at 68.8% at 6 months ($P < 0.01$).
Floyd et al. (2007) (5)	830 non-pregnant women aged 18–44 years in three states, United States.	Randomized control trial	CHOICES; four face-to-face motivational interviewing sessions (45–60 minutes) plus one contraceptive consultation. Follow-up at 3, 6 and 9 months. Control group received information only.	Risk of AEP: in last 90 days risky drinking (5 drinks or more per occasion and 8 drinks or more per week), and intercourse without effective use of contraception.	Among women who received the intervention the odds for reducing their risk of having an AEP were 2.32 (95% confidence interval (CI): 1.69–3.20) at 3 months, 2.15 (95% CI: 1.52–3.06) at 6 months, and 2.11 (95% CI: 1.47–3.03) at 9 months, compared to the control group. Changes in one or two forms of behaviour at 3 months, 33.8% of the intervention group and 36.2% of the control group had reduced their AEP risk through increased contraception use only, 27.6% and 34.9%, respectively, through reducing their risky drinking only and 38.6% and 28.9%, respectively changed both kinds of behaviour ($P < 0.05$). At 9 months, 32.8% of the intervention group and 31.1% of the control group had changed contraception use only, 19.9% and 34.1%, respectively, only reduced their drinking and 47.3% and 34.8%, respectively, changed both ($P < 0.05$).

Table 3.1 contd

Reference	Study population	Study design	Type of intervention	Main outcome measures	Main findings
Hanson et al. (2012) (6)	119 non-pregnant American Indian women aged 18–44 years in Northern Plains, United States.	Cross-sectional	Multimedia campaign on FASD, including radio, posters.	Knowledge of FAS and subjective reporting on reduced alcohol consumption.	The results showed that in the self-selected convenience sample of women of childbearing age (N=119), 85.7% believed that the campaign was culturally appropriate, 91.6% felt it had increased their knowledge about FAS and 93.3% had increased their knowledge about the risks of drinking in pregnancy. The majority (71.8%) had reduced their drinking as a result of the campaign. These results are, however, based on subjective perception rather than an alcohol screening tool, and no pre- or post-campaign measures were presented.
Hanson et al. (2013) (7)	231 non-pregnant American Indian women, aged 18–44 years in Northern Plains, United States.	Longitudinal	Motivational interviewing intervention adapted from the CHOICES intervention; five sessions motivational interviewing over telephone and written material through mail. Follow-up at 3, 6, 9 and 12 months.	Risk of AEP: in last 90 days any alcohol use and intercourse without effective use of contraception. Readiness to change behaviour.	At baseline, 54% of women were at risk of having an AEP. The proportion of women at risk following the interventions fell significantly from baseline to 29% at 3 months, 27% at 6 months, 35% at 9 months and 20% at 12 months ($P < 0.001$). There was no significant difference between the follow-up points.
Ingersoll et al. (2005) (8)	228 non-pregnant women aged 18–24 years at a Mid-Atlantic university, United States.	Randomized control trial	BALANCE; face-to-face single session motivational interviewing (60–75 minutes) with personalized feedback about risky drinking and pregnancy risk. Follow-up at 1 month. Control group received information only.	Risk of AEP; in last 90 days risky drinking (5 drinks or more per occasion or 8 drinks or more per week) and intercourse without effective use of contraception.	All women were at risk at baseline, and at 1 month follow-up 26.1% of women who received the intervention were still at risk, compared to 45.7% of women in the control group ($P < 0.05$).

Table 3.1 contd

Reference	Study population	Study design	Type of intervention	Main outcome measures	Main findings
Ingersoll et al. (2013) (9)	217 non-pregnant women aged 18–44 years in Virginia, United States.	Randomized control trial	EARLY; face-to-face single-session motivational interviewing (60 minutes) with assessment feedback. Follow-up at 3 and 6 months. Comparison groups either got an information video on AEP risk and women's health followed by 5 minutes debrief with counsellor, or an information leaflet on topics including women's health, FASD and contraception.	Risk of AEP: in last 90 days risky drinking (3 drinks or more per occasion or 7 drinks or more per week) and intercourse without effective use of contraception.	All women were at risk of having an AEP at baseline. Across the entire sample this risk decreased by 45.9%. Across the conditions there was no significant difference in drinks per day. The proportion of women who received the EARLY intervention still at risk at follow-up was 63.3% at 3 months and 44.7% at 6 months. The proportion still at risk for women who received the information video was 69.6% at 3 months and 63.8% at 6 months, and for those who received the information leaflet it was 71.6% at 3 months and 54.0% at 6 months. Effect sizes (Cohen's d) for ineffective contraception use were small between conditions; EARLY vs information video $d=0.32$ (95% CI: $-0.05-0.69$) at 3 months and $d=0.26$ (95% CI: $-0.16-0.67$) at 6 months. EARLY vs information leaflet $d=0.05$ (95% CI: $-0.31-0.40$) at 3 months and $d=0.14$ (95% CI: $-0.25-0.53$) at 6 months. For risk of AEP effect, sizes were also small: EARLY vs information video $d=0.16$ (95% CI: $-0.27-0.12$) and EARLY vs information leaflet $d=0.21$ (95% CI: $-0.20-0.62$). At 6 months the proportion at risk was 44.9% with EARLY, 63.8% with the information video and 54% with the information leaflet. EARLY vs the information video was $d=0.43$ (95% CI: $-0.03-0.88$) and EARLY vs the information leaflet was $d=0.20$ (95% CI: $-0.21-0.62$).
Montag et al. (2015) (10)	247 non-pregnant American Indian/Alaska native women aged 18–45 years in California, United States.	Randomized control trial	Adapted version of e-CHUG, online intervention (20 minutes) with personalized feedback. Follow-up at 1, 3 and 6 months.	At risk of AEP: in last 2 weeks risky drinking (3 drinks or more per occasion or 8 drinks or more per week) and intercourse without effective use of contraception.	High risk of AEP in the intervention group was 36.4% at baseline, 18.8% at 1 month, 16.7% at 3 months and 18.9% at 6 months. In the control group it was 33.6% at baseline, 21.9% at 1 month, 21.7% at 3 months and 22.1% at 6 months. These differences had significant time effects ($P = 0.000$), although there was no significant effect on the treatment by time interaction between the conditions ($P = 0.716$). There were also significant decreases in drinks per week and binge episodes over time but no significant differences between the groups' conditions.

Table 3.1 contd

Reference	Study population	Study design	Type of intervention	Main outcome measures	Main findings
Rendall-Mkosi et al. (2013) (11)	165 non-pregnant women aged 18–44 years in Western Cape, South Africa.	Randomized control trial	CHOICES-based motivational interviewing intervention delivered face to face, five sessions, both drinking behaviour and contraception included but focus for motivational interviewing was based on the individual need. Follow-up at 3 and 12 months. Control group received an information leaflet on women's health and FAS.	Risk of AEP: in last 90 days risky drinking (5 drinks or more per occasion or 7 drinks or more per week) and intercourse without effective use of contraception.	At baseline all women were at risk of having an AEP. At 3 months post-intervention 50.0% of the intervention group and 71.9% of the control group were still at risk of having an AEP ($P = 0.004$). At 12 months, 49.2% of the intervention group and 75.4% of the control group were still at risk ($P = 0.009$). The odds for not being at AEP risk in the motivational interviewing group compared to the control group (in an intention-to-treat (ITT) analysis) was 2.19 (95% CI: 1.18–5.94) at 12 months. There were no significant reductions between groups in risky drinking at 3 or 12 months, although the intervention group reduced their AUDIT score by 1 compared to 0 in the control group at 12 months ($P = 0.012$). Significant reduction in women not using effective contraception; for motivational interviewing reduction was 35.71% and for control group 11.48% at 3 months ($P = 0.002$) at 12 months 42.62% for motivational interviewing and 25% for controls reduction was ($P = 0.037$).
Tenku et al. (2011) (12)	458 non-pregnant women aged 18–44 years in Missouri, United States.	Pre/post intervention study	Tailored motivating messaging, delivered either by mail or online (participants self-selected the type of intervention). Follow-up at 4 months.	Risk of AEP: any alcohol use in last 30 days and intercourse without effective use of contraception in last 4 months.	All women were at risk of having an AEP at baseline. At 4 months follow-up 33.9% of women who received the mail intervention and 43.8% of women who received the online intervention were still at risk. These differences were not statistically significant ($P = 0.16$). There was no significant difference in women who had stopped drinking at follow-up since delivery of the intervention and no significant difference in proportion of women who were using effective contraception.

Table 3.1 contd

Reference	Study population	Study design	Type of intervention	Main outcome measures	Main findings
Wilton et al. (2013) (13)	131 non-pregnant women aged 18–44 years in Wisconsin, United States.	Randomized trial	Healthy Choices intervention (adapted from the Healthy Mom's study and CHOICES), brief counseling sessions (based on motivational interviewing and cognitive behavioural therapy), two sessions delivered either by telephone or face to face focusing on alcohol use and contraception use. Follow-up at 6 months.	Risk of AEP: in last 90 days risky drinking (3 drinks or more on any day or 7 drinks or more per week) and intercourse without effective use of contraception.	All women were at risk of having an AEP at baseline. At 6 months the proportion of women at risk was 52% ($P < 0.05$, ITT analysis). There was no significant difference between the groups reached in person (48%) or by telephone (56%) as regards AEP risk at follow-up. Risk of pregnancy was reduced from 100% to 56% at 6 months ($P < 0.05$, ITT analysis), but there was no significant difference between the groups (51% and 62%, respectively $P = 0.344$). Risky drinking significantly decreased from 100% to 89% ($P < 0.05$, ITT analysis) but there was no significant difference between groups (88% and 90% respectively).

Table 3.2 Summary of included studies to reduce alcohol use in pregnancy

Reference	Study population	Study design	Type of intervention	Outcome measures	Main findings
Bortes et al. (2015) (14)	564 pregnant women (first visit, weeks pregnant not specified) attending antenatal care in Stockholm, Sweden.	Randomized control trial.	An educational leaflet about alcohol and pregnancy provided before the first antenatal care visit. Control group received the leaflet at the first visit and received standard antenatal care.	Alcohol abstinence.	The majority of both intervention group and control group were abstinent from alcohol at the first antenatal care visit, although women in the intervention group were more likely to be abstinent (92% and 82%, respectively $P = 0.005$). Women in the intervention group were more than twice as likely to abstain from alcohol as those in the control group (OR=2.6, 95% CI: 1.3–5.1, $P = 0.005$).
Chang et al. (2005) (15)	304 pregnant women (median 11–12 weeks), T-ACE-positive, Massachusetts, United States.	Randomized trial.	Face-to-face, single-session brief intervention (25 minutes) delivered by nurse practitioner or researcher. Follow-up post-partum. Control group received assessment only.	Alcohol use (drinks per drinking day and percentage of drinking days).	In the full sample, women on average consumed alcohol on 20% of days prior to pregnancy, falling to 5% from the time pregnancy was recognized to enrolment in the study. Both intervention and control groups reduced the proportion of drinking days by about 2%, and SD per drinking day by 0.39 in the intervention group and 0.40 in the control group (not significant). The brief intervention was more effective among both women who drank more at the time of enrolment in the study and women who were defined as heavy drinkers and whose partners took part in the study (reduced proportion of drinking days and combined frequency and quantity measure, $P < 0.05$).

Table 3.2 contd

Reference	Study population	Study design	Type of intervention	Outcome measures	Main findings
Chang et al. (2006) (16)	115 pregnant women (median 11 weeks), T-ACE-positive, Massachusetts United States (N=115).	Subsample of randomized trial.	Face-to-face, single-session brief intervention (25 minutes) delivered by nurse practitioner to women and their partners. Women set their drinking goal for the pregnancy (abstinence or cut down). Follow-up post-partum (using timeline follow-back).	Alcohol abstinence.	Among women who were drinking when they enrolled in the study and set abstinence as their drinking goal, 50% were abstinent at follow-up compared to 0% of women whose drinking goal was to cut down. Among women who were abstinent at enrolment, 75% remained abstinent at follow-up ($P < 0.001$). Non-abstinent women with the goal to cut down reported on average 1.28 occasions where they felt tempted to drink ('risk situations'), compared to 1.0 of non-abstinent women with the goal to abstain and 0.70 among abstainers ($P < 0.001$). Non-abstinent women were more likely to perceive celebrations as risk situations. Non-abstinent women aiming to cut down were more likely to mention craving as a risk situation (12%) than women aiming to abstain (6.67%) and those abstinent at enrolment (1.67%, $P = 0.046$).
Evans et al. (2012) (17)	123 pregnant women (gestation not stated) recruited from a low-income population in Virginia, United States.	Randomized control trial.	Text messages giving information and advice on prenatal and post-natal care, specifically designed for women of low socioeconomic status, follow-up 2–3 months. Control group received assessment and usual care.	Any alcohol use since pregnancy recognition and attitudes towards harm to baby from drinking.	No significant decrease in attitude that alcohol can harm the baby in overall sample or in intervention and control groups. No significant reductions in any alcohol use at follow-up compared to baseline. Overall, women who had at least high school education were more likely to agree to the statement that alcohol can harm the baby (OR=3.57, 95% CI: 1.13–11.24, $P = 0.29$).

Table 3.2 contd

Reference	Study population	Study design	Type of intervention	Outcome measures	Main findings
France et al. (2014) (18)	354 pregnant and non-pregnant women aged 18–45 years in Perth, Australia.	Randomized controlled trial.	<p>Three different approaches displayed as a story-board format (self-efficacy, threat appeal, combined self-efficacy and threat appeal), including scenarios related to alcohol and pregnancy.</p> <p>The control condition included a scenario related to abstaining from alcohol as positive behaviour, with no mention of pregnancy.</p>	Intention to abstain or intention to reduce alcohol intake in a current or future pregnancy, confidence to abstain or reduce alcohol use in a current or future pregnancy.	<p>The self-efficacy only message was associated with a higher intention to abstain, compared to the control condition (25.5% vs 19.0%, $P \leq 0.005$). The threat appeal had a significantly higher proportion of women intending to abstain compared to the self-efficacy and control conditions (48.2% vs 29.5% and 19.0%, respectively, $P \leq 0.005$), as did the combined approach (48.1% vs 29.5% and 19.0%, respectively, $p \leq 0.05$). Women in the threat condition were more confident about being able to abstain, compared to the self-efficacy and control conditions (42.2% vs 27.3% and 29.5%, respectively), as were women in the combined condition (44.4% vs 27.3% and 29.5%, respectively). Women in the threat and combined conditions were also significantly more likely to intend to reduce their intake compared to the self-efficacy only and control conditions. The threat and combined conditions also had a significant impact on women's confidence to abstain compared to the self-efficacy and control conditions.</p>
Högberg et al. (2015) (19)	526 pregnant women (at registration, around week 6–7) attending antenatal care in three counties in Sweden.	Quasi-experimental.	<p>Face-to-face dialogue (length not stated) about alcohol from a life-cycle perspective (including history of alcoholism in the family) with both woman and partner, and a booklet about alcohol and pregnancy. Follow-up in week 33 of gestation.</p> <p>Control group received standard care.</p>	Alcohol use (AUDIT-C).	<p>There was no significant difference in AUDIT scores at follow-up between the intervention group and control group, and no difference in the proportion of women who continued to drink in the two conditions. Women who received the intervention were more likely to report that their partner always offered them non-alcoholic options compared to controls (77.1% and 63.4%, respectively, $P = 0.002$),* while women who received the interventions were twice as likely to report this (OR=2.13, 95% CI: 1.29–3.51). Women in the intervention group were more likely to report antenatal care as the most important source of information (68%) compared to the control group (52.2%) ($P = 0.001$).</p> <p>*Proportions not reported in the article, provided through communication with author.</p>

Table 3.2 contd

Reference	Study population	Study design	Type of intervention	Outcome measures	Main findings
Lowe et al. (2010) (20)	Pregnant women attending woman and child clinics in Iowa, United States (N=700).	Cluster randomized control trial.	Multimedia campaign on alcohol use in pregnancy and FAS; usual care and advice to abstain from alcohol, a 10-minute DVD, and a pamphlet. Control group received advice to abstain during usual care and opportunity to watch 10-minute DVD.	Recall of campaign, discussions with others about the content, and changes in knowledge.	Compared to the controls, the women in the intervention group were more likely to recall having seen the information from the material (64.1% vs 48.5%, $P < 0.001$). Half of the intervention group had watched the DVD and 62.2% had passed on information to other women. Women who received the intervention were also more likely to have talked to at least one of their friends about alcohol and pregnancy (58.3% vs 49.4%, $P = 0.05$). Women in the intervention group increased their knowledge post-intervention on a set of four questions on the risks of prenatal drinking by 4.2%, compared to 0.9% of controls ($P < 0.05$).
Marais et al. (2011) (21)	194 pregnant women (mean 15 weeks) in Western Cape Province, South Africa.	Cluster randomized trial.	Face-to-face, four sessions brief interventions, follow-up at 1.5, 3 and 4.5 months for the intervention group and 4.5 months post-intervention for the control group. The control group received baseline and follow-up, and written information about alcohol at baseline assessment.	Alcohol use (AUDIT).	72% of women in the intervention group and 41% of women in the control group had reduced their AUDIT scores at the post-intervention assessment. Following the intervention, women in the intervention group had on average 1.97 lower AUDIT scores than women in the control group ($P = 0.002$).
Nilsen et al. (2010) (22)	1848 pregnant women (10–12 weeks) in Linköping, Sweden.	Cross-sectional cohort study.	Questionnaire-based counselling using AUDIT-C to initiate discussion based on concept of motivational interviewing (embedded in first visit with midwife, which is approximately 60–90 minutes), compared to pre-intervention where usual care was provided.	Alcohol use since pregnancy was recognized (frequency, quantity and heavy episodic drinking).	Prevalence of alcohol use in pregnancy was 6.8% among women who received usual care and 6.9% in the counselling group ($P = 0.927$). No significant difference in reported frequency of alcohol use in pregnancy, quantity consumed on a typical occasion or binge drinking. More women in the counselling group perceived the advice from maternity services to be complete abstinence (91.6% vs 84.5%, $P < 0.001$) and that the advice was easy to understand and coherent (76.9% vs 66.5%, $P < 0.001$) and felt they got sufficient advice (70.5% vs 58.8%, $P < 0.001$).

Table 3.2 contd

Reference	Study population	Study design	Type of intervention	Outcome measures	Main findings
O'Connor and Whaley (2007) (23)	225 pregnant women (mean 18 weeks), current drinkers, in California, United States (N=255).	Cluster randomized control trial.	Face-to-face, single-session (10–15 minutes), brief intervention (extension of nutrition education), delivered by a nutritionist. Follow-up in third trimester. Control group received assessment only.	Abstinence and maximum drinks per drinking occasion.	Women who received the brief intervention were more likely to be abstinent in the third trimester than women who were only assessed (OR=5.39, 95% CI: 1.59–18.25, $P < 0.05$). There was a positive effect on birth outcomes (such as birth length) among women in the intervention group who drank more than two drinks per occasion prior to enrolment.
Osterman & Dyehouse (2012) (24)	67 pregnant women (mean 20.7 weeks) in midwestern United States.	Randomized control trial.	Face-to-face, single-session motivational interviewing (30 minutes) delivered by a psychiatric mental health nurse. Follow-up 4–6 weeks post-intervention. Control group received assessment only.	Drinking days per week, drinks per day and basic psychological needs assessment.	No significant difference in number of drinks per week or drinks per day between the intervention and control groups at follow-up compared to baseline. Contrary to the hypothesis, the control group had a significantly larger decrease in number of drink days per week (mean=-1.38, standard deviation=1.25) than the intervention group (mean=-0.875, standard deviation=0.919) ($P < 0.05$). The control group also had a larger increase in basic psychological needs in a drinks per week model (intervention group: mean=0.123, standard deviation=0.456; control group: mean=0.352, standard deviation=0.495, $P = 0.04$).
Osterman et al. (2014) (25)	122 pregnant women (mean 24.3 weeks) in midwestern United States.	Experimental two groups: pre-test and post-test.	Face-to-face, single-session motivational interviewing (30 minutes) delivered by researcher. Follow-up 30 days post-baseline and 30 days post-partum. Control group received standard care.	Drinking days per week, drinks per day, AUDIT score and basic psychological needs assessment.	No statistically significant difference between intervention and control groups as to number of drinks per day or drinks per week. Significant reduction in AUDIT scores in both groups at both follow-ups (compared to baseline) ($P < 0.001$), although between follow-ups there was a slight increase. These differences could not be modelled due to small sample size. Both groups also increased their basic psychological needs scores and relative autonomy index, and both were hypothesized to improve in the intervention group.

Table 3.2 contd

Reference	Study population	Study design	Type of intervention	Outcome measures	Main findings
Rossi et al. (2013) (26)	37 women receiving first cycle of IVF treatment (pre-embryo transfer) in Massachusetts, United States.	Randomized control trial.	Face-to-face, single-session brief intervention following alcohol assessment, follow-up at 3, 6 and 12 months. Control group received assessment only.	Alcohol use (drinks per drinking day, number of binges in past 6 months, drinking above safe daily limit in past 6 months, percentage of drinking days in past 6 months) and IVF outcomes.	Women in the intervention group significantly reduced their alcohol intake by 1.0 drink per day, compared to 0.4 drinks in the control group ($P = 0.004$). No significant changes in number of binges in the last six months, number of weeks of consuming above the safe daily limit (7 drinks or less per week or 3 drinks per day) or proportion of drinking days in the last 6 months. No significant differences between the two groups on IVF outcomes.
Sheehan et al. (2014) (27)	656 pregnant women (mean 16.1 weeks) in Dublin, Ireland (N=656).	Controlled trial.	Face-to-face single brief intervention (5 minutes), follow-up at 4 months. Control group received usual care.	Alcohol use (AUDIT).	Women reported their alcohol consumption before and during pregnancy (at booking and at 32 weeks) using AUDIT. No significant differences in changes in AUDIT scores between the groups. Both intervention and control groups reduced their AUDIT scores from 6.37 and 5.95 respectively for the 12-month period before pregnancy to 1.04 and 0.93, respectively, at booking in and 0.78 and 0.70, respectively, at 32 week follow-up. Intervention was not associated with lower AUDIT scores post-intervention, although those who were older (not specified what age groups were included in the analysis), of Irish nationality and with higher AUDIT scores at booking in assessment had significantly higher scores at 32 weeks.
Tzilos et al. (2011) (28)	50 pregnant women (mean 25 weeks), positive screen for risky drinking, in inner city clinics (state not specified), United States.	Randomized trial.	Computer-based, single-session brief intervention (15–20 minutes) focusing on drinking behaviour and goal-setting for pregnancy. Follow-up at 30 days. Control group completed a brief screening test and a control computerized session (about TV show preferences) and received a brochure about alcohol use in pregnancy.	Any alcohol use (time-line follow-back).	Both intervention and control groups significantly reduced any alcohol use from baseline. At baseline, 72% of women reported any drinking compared to 10% at follow-up. No significant differences between the two conditions. The intervention was perceived as acceptable, including among women who were drinking at higher levels. Significantly better birth outcomes (such as birth weight) in the intervention group compared to controls.

Table 3.2 contd

Reference	Study population	Study design	Type of intervention	Outcome measures	Main findings
van der Wulp et al (2014) (29)	393 pregnant women (mean 8 weeks) who reported any alcohol use since knowing they were pregnant in the Netherlands.	Cluster randomized control trial.	Computer-based feedback intervention or health counselling with midwife intervention (both single-session), follow-up at 3 and 6 months. Control group received usual care.	Alcohol use (any alcohol use and weekly consumption assessed with the five-item Dutch quantity-frequency-variability questionnaire)	No significant difference in abstinence or drinks per week at 3 months between the three conditions. Women in the computer-tailored group were more likely to abstain compared to the usual care group (OR=2.77, 95% CI: 1.02–7.34) at 6 months, but no difference was seen between computer-tailoring and health counselling, or usual care and health counselling. The computer-tailored intervention significantly reduced intake among women who consumed 1 standard deviation below the mean before pregnancy ($P < 0.001$) but not among women who consumed 1 standard deviation above the mean ($P = 0.57$).

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